REMARKS

Claims 1, 5-11, and 15-42 are pending in the instant application. Of these, claims 1, 10, 15, 19, 31 are being amended and claims 34-42 are being added. Claims 2-4, 11-13, 21, and 33 are being cancelled without prejudice or disclaimer.

Applicant requests entry of the claim amendments and added claims, which are fully supported by the Specification and original claims and add no new matter. For example, the amendments to claims 1 and 10 are supported at claims 4 and 14 as originally filed. The amendments to claims 19 and 31 are supported at claims 23 and 37. Added claims 34 and 35 are supported at claims 6 and 15 as originally filed. Added claims 36 and 37 are supported at pages 8 and 9 of the Specification as originally filed. Added claim 38 is supported at claim 28 as originally filed. Added claims 39 and 40 are supported at claim 24 as originally filed. Added claims 41 and 42 is supported at claim 26 as originally filed.

Reconsideration and allowance of the present claims in view of the amendments and remarks herein is requested.

Claim Objections

The Examiner objected to claims 7, 16, 28, and 33 for reciting "1800 Kelvin". The Examiner alleges that this expression should be corrected to "1800 degrees Kelvin".

However, the term "Kelvin" is not preceded by the term "degrees" under scientific convention. As specified in *College Chemistry*, Nebergall et al., pg. 17:

> A temperature on the Celsius scale is converted to the Kelvin scale by adding 273.15 to the Celsius reading; to convert from Kelvin to Celsius, 273.15 is subtracted from the Kelvin reading. (Note that temperatures on the Kelvin scale are, by convention, reported **without the degree sign.**) (Emphasis added.)

Thus, the objection to claims 7, 16, 28, and 33 is believed to be improper.

102(b) Rejection of Claims 1 and 2

The Examiner rejected claims 1 and 2 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,422,926 to Smith et al. (Smith et al.) This rejection is respectfully traversed.

Claim 1 is allowable over Smith et al. under Section 102(b) because Smith et al. fails to teach an electron source comprising, inter alia, cathode comprising "a beam-receiving portion ... having a substantially concave surface" and "a lens adapted to direct [an] electromagnetic radiation beam onto the substantially concave surface of the beam-receiving portion of the cathode." As acknowledged by the Examiner, Smith et al. does not teach "the structural configuration of the cathode." Thus, claim 1 and the claims dependent therefrom, including claim 2, are allowable over Smith et al.

103(a) Rejection of Claims 3-5, 7, 10-14, 16, 19-21, and 31-33

The Examiner rejected claims 3-5, 7, 10-14, 16, 19-21, and 31-33 under 35 U.S.C. 103(a) as being unpatentable over Smith et al. in view of U.S. Patent 4,588,928 to Liu et al. (Liu et al.) This rejection is respectfully traversed.

Claim 1

Smith et al. does not teach what is recited in claim 1 because Smith et al. does not teach an electron source comprising, inter alia, a cathode comprising a beam-receiving portion having a substantially concave surface and a lens adapted to direct an electromagnetic radiation beam onto the substantially concave surface of the beam-receiving portion. The Examiner acknowledges that Smith et al. does not teach the structural configuration of the cathode.

The Examiner relies on Liu et al. to teach the substantially concave beam-receiving portion, but Liu et al. does not teach any beam-receiving portion. Liu et al. teaches a support member (12), but this support member (12) is not the same as the beam-receiving portion of claim 1. For example, the support member (12) is not adapted to receive an electromagnetic radiation beam, nor does Liu et al. teach directing an electromagnetic radiation beam onto the support member (12).

Additionally, the support member (12) of Liu et al. does not comprise a substantially concave surface. Instead, Liu et al. discloses that the support member (12) is a U-shaped wire. A wire has a cylindrical and convex outer surface rather than a concave surface. Nor does Liu et al. teach "a lens adapted to direct the electromagnetic radiation beam onto the substantially concave surface of the beam-receiving portion of the cathode." The lens in the electron source of claim 1, which directs the electromagnetic radiation beam onto the substantially concave surface, allows internal reflections of the electromagnetic radiation beam to improve absorption of the

electromagnetic radiation beam and substantially uniformly conduct the heat generated by the beam to the electron emitting portion, as discussed in the Specification of the instant Application.

Furthermore, it would not have been obvious to one of ordinary skill to combine Smith et al. and Liu et al. to derive claim 1 because Smith et al. discloses illuminating a photocathode, while Liu et al. discloses a field-emitter cathode. The photocathode of Smith et al. uses illumination in order to emit electrons. In contrast, the field-emitter cathode of Liu et al. uses a sufficiently strong electric field in order to emit electrons. Neither Smith et al. nor Liu et al. teaches or suggests that illumination of a field-emitter cathode would result in improved electron emission of the field-emitter cathode. Therefore, one of ordinary skill would not have been motivated to combine the light source (56) of Smith et al. with the field-emitter cathode of Liu et al.

Thus, claim 1 and the claims dependent therefrom, including claims 3-5, and 7, are allowable over Smith et al. and Liu et al.

Claim 10

Smith et al. fails to teach the electron beam apparatus recited in claim 10 because Smith et al. does not teach, inter alia, a cathode comprising a beam-receiving portion having a substantially concave surface and a lens adapted to direct the electromagnetic radiation beam onto the substantially concave surface of the beam-receiving portion of the cathode.

Liu et al. does not make up for the deficiencies of Smith et al. because Liu et al. also fails to teach a cathode comprising a beam-receiving portion having a substantially concave surface and a lens adapted to direct the electromagnetic radiation beam onto the substantially concave surface of the beam-receiving portion. For example, the support member (12) is not adapted to receive an electromagnetic

radiation beam, nor does the support member (12) have a substantially concave surface.

Thus, claim 10 and the claims dependent therefrom, including claims 11-14, 16, 19, and 21, are allowable over Smith et al. and Liu et al.

Claim 19

Claim 19 is allowable over Smith et al. because, as acknowledged by the Examiner, Smith et al. fails to teach a method comprising, inter alia, "heating the cathode to at least about 1800 Kelvin."

Liu et al. does not make up for the deficiencies of Smith et al. because Liu et al. does not teach "heating the cathode to at least about 1800 Kelvin by directing an electromagnetic radiation beam onto the cathode." Instead, Liu et al. teaches a field-emitter cathode, and there is no mention of heating the field-emitter cathode by illuminating the field-emitter cathode with an electromagnetic radiation beam.

Furthermore, it would not have been obvious to one of ordinary skill to combine the teachings of Smith et al. with the teachings of Liu et al. to derive the method of claim 19. Smith et al. discloses illuminating a "photocathode," while Liu et al. discloses a "field-emitter cathode." The photocathode of Smith et al. by definition needs illumination in order to emit electrons. In contrast, the field emitter cathode of Liu et al. needs a sufficiently strong electric field in order to emit electrons. Neither Smith et al. nor Liu et al. teaches or suggests that illumination of a field-emitter cathode would result in improved electron emission of the field-emitter cathode. Therefore, there would not have been motivation to one of ordinary skill to combine the light source (56) of Smith et al. with the field-emitter cathode of Liu et al.

Thus, claim 19 and the claims dependent therefrom, including claims 20

and 21, are allowable over Smith et al. in view of Liu et al.

Claim 31

Claim 31, as amended, is allowable over Smith et al. and Liu et al. because neither Smith et al. nor Liu et al. teaches "heating the cathode to at least about 1800 Kelvin by generating an electromagnetic radiation beam and directing the electromagnetic radiation beam onto the cathode." As acknowledged by the Examiner, Smith et al. fails to teach a method comprising, inter alia, "heating the cathode to at least about 1800 Kelvin."

Liu et al. does not make up for the deficiencies of Smith et al. because Liu et al. does not teach "heating the cathode to at least about 1800 Kelvin by directing an electromagnetic radiation beam onto the cathode." Instead, Liu et al. teaches a field-emitter cathode, and there is no mention of illuminating the field-emitter cathode with an electromagnetic radiation beam.

Thus, claim 31 and the claims dependent therefrom, including claims 32 and 33, are allowable over Smith et al. and Liu et al.

103(a) Rejection of Claim 8

The Examiner rejected claim 8 under 35 U.S.C. 103(a) as being unpatentable over Smith et al. in view of WO 96/02932 to Osborne et al. (Osborne et al.) This rejection is respectfully traversed.

Claim 8 is allowable over Smith et al. because it is dependent from claim 1, which is allowable over Smith et al. for the reasons given above. Osborne et al. fails to make up for the deficiencies of Smith et al. because Osborne et al. also does not teach an electron source comprising, inter alia, a cathode comprising a beam receiving portion having a substantially concave surface, and a lens adapted to direct the

electromagnetic radiation beam onto the substantially concave surface of the beam-receiving portion of the cathode.

Instead, Osborne et al. teaches a resistive focusing lens structure for an electron beam device. (Abstract.) Osborne et al. does not make any disclosure of a cathode comprising a beam-receiving portion. Osborne et al. also fails to disclose an electromagnetic radiation beam.

Furthermore, in regard to claim 8, the lens of claim 8 is adapted to direct electromagnetic radiation. In contrast, Osborne et al. teaches a resistive focusing lens structure that focuses an electron beam in an electron beam device. The resistive focusing lens structure of Osborne et al. is adapted to focus an electron beam, which is not the same as a lens adapted to direct an electromagnetic radiation beam.

Thus, claim 1 and the claims dependent therefrom, including claim 8, are allowable over Smith et al. and Osborne et al.

103(a) Rejection of Claim 17

The Examiner rejected claim 17 under 35 U.S.C. 103(a) as being unpatentable over Smith et al. in view of Liu et al., and further in view of Osborne et al. This rejection is respectfully traversed.

Claim 17 is allowable over Smith et al. in view of Liu et al. because it is dependent from claim 10, which is allowable over these references for the reasons given above. Osborne et al. fails to make up for the deficiencies of Smith et al. and Liu et al. because Osborne et al. also does not teach a cathode comprising a beam-receiving portion having a substantially concave surface and a lens adapted to direct the electromagnetic radiation beam onto the substantially concave surface of the beam receiving portion of the cathode. Osborne et al. makes no mention of a cathode

comprising a beam receiving portion, nor does Osborne et al. disclose any electromagnetic radiation beam.

Thus, claim 10 and the claims dependent therefrom, including claim 17, are allowable over Smith et al., Liu et al., and Osborne et al.

103(a) Rejection of Claim 9

The Examiner rejected claim 9 under 35 U.S.C. 103(a) as being unpatentable over Smith et al. in view of U.S. Patent 3,583,810 to Johnson et al. (Johnson et al.) This rejection is respectfully traversed.

Claim 9 is allowable over Smith et al. because it is dependent from claim 1, which is allowable over Smith et al. for the reasons provided above. Johnson et al. fails to make up for the deficiencies of Smith et al. because Johnson et al. also does not teach an electron source comprising, inter alia, a cathode comprising a beam-receiving portion having a substantially concave surface and a lens adapted to direct an electromagnetic radiation beam onto the substantially concave surface of the beam-receiving portion.

Instead, Johnson et al. discloses a spectral radiation device in which a beam of spectral radiation from a cathode (24) is focused by a lens (55) into a fluorescing region (82) lying within a region defined between an anode (30) and an auxiliary electrode (50), as shown in Figure 1. (Col. 4, lines 59-68.) Additionally, an aperture (42) provides optical shielding of the cathode (24). (Col. 3, lines 26-30.) By teaching that the cathode should be optically shielded from spectral radiation, Johnson et al. teaches away from a lens adapted to direct an electromagnetic radiation beam onto the beam-receiving portion of the cathode of claim 1.

Thus, claim 1 and the claims dependent th refrom, including claim 9, are

allowable over Smith et al. and Johnson et al.

103(a) Rejection of Claims 18 and 22

The Examiner rejected claims 18 and 22 under 35 U.S.C. 103(a) as being unpatentable over Smith et al. in view of Liu et al., and further in view of Johnson et al. This rejection is respectfully traversed.

Claim 10

Claim 18 is allowable over Smith et al. and Liu et al. because it is dependent from claim 10, which is allowable over Smith et al. in view of Liu et al. for the reasons given above. Johnson et al. fails to make up for the deficiencies of Smith et al. and Liu et al. because Johnson et al. also does not teach a cathode comprising a beam-receiving portion having a substantially concave surface and a lens adapted to direct an electromagnetic radiation beam onto the substantially concave surface of the beam-receiving portion.

Instead, Johnson et al. teaches optically shielding of a cathode (24), and thereby teaches away from a lens adapted to direct an electromagnetic radiation beam onto the beam-receiving portion of the cathode of claim 1. Thus, claim 10 and the claims dependent therefrom, including claim 18, are allowable over Smith et al., Liu et al., and Johnson et al.

Claim 19

Claim 22 is allowable because it is dependent from claim 19, which recites a method comprising, inter alia, "heating the cathode to at least about 1800 Kelvin." Claim 19 is allowable over Smith et al. and Liu et al. for the reasons provided above, and further allowable over Johnson et al. because Johnson et al. fails to disclose any particular temperature range at which to heat a cathode, nor does Johnson et al. suggest heating a cathode to a temperature of at least about 1800 Kelvin. Thus, claim

19 and the claims dependent therefrom, including claim 22, are allowable over Smith et al., Liu et al., and Johnson et al.

Objected-to Claims

The Examiner objected to claims 6 and 15 as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claim. The Examiner indicated that "the primary reason for the indication of the allowability of the claimed invention is the inclusion of the limitation, in the combination as currently claimed, that the lens used for directing the electromagnetic radiation beam onto the cathode, is attached to the rod whose terminal is the electron emitting portion of the cathode of the electron beam generator. Claims 34 and 35, which are being added to at least partially correspond to claims 6 and 15, recite a cathode comprising an electron emitting portion, a rod that terminates in the electron emitting portion, and a lens attached to the rod. Thus, claims 34 and 35 are believed to be allowable.

Allowed Claims

Applicant thanks the Examiner for the allowance of claims 23-30.

Added Claims

Added claim 36 is allowable because none of the cited references teach a method comprising, inter alia, "negatively biasing the cathode relative to the anode," "directing an electromagnetic radiation beam onto the cathode," and "determining a temperature of the cathode and adjusting the amount of heat applied to the cathode. "

Added claim 37 is allowable because none of the cited references teach an electron source comprising, inter alia, "an electromagnetic radiation source adapted to generate an electromagnetic radiation beam to heat the cathode," "a lens adapted to direct the electromagnetic radiation beam onto the cathode," and "a thermostat adapted to determine a temperature of the cathode and adjust the amount of heat applied to the cathode.

Added claim 38 is allowable because none of the cited references teach an electron source comprising, inter alia, "an electromagnetic radiation source adapted to heat the cathode to at least about 1800 Kelvin by generating an electromagnetic radiation beam" and "a lens adapted to direct the electromagnetic radiation beam onto the cathode." For example, neither Smith et al. nor Liu et al. teaches or suggests that illumination of a field-emitter cathode results in improved electron emission of the field-emitter cathode. Therefore it would not have been obvious to combine Smith et al. and Liu et al. to derive "an electromagnetic radiation source adapted to heat the cathode to at least about 1800 Kelvin by generating an electromagnetic radiation beam" and "a lens adapted to direct the electromagnetic radiation beam onto the cathode."

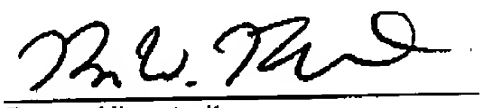
CONCLUSION

The above-discussed amendments and remarks are believed to place the present application in condition for allowance. Should the Examiner have any questions regarding the above remarks, the Examiner is requested to telephone Applicant's representative at the number listed below.

Respectfully submitted,

JANAH & ASSOCIATES, P.C.

Date: June 18, 2003

By: 

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